Proposed Agreement between California Energy Commission and The Regents of the University of California on behalf of the UC Davis Campus

Title: Wind Ramp - Short Term Event Prediction Tool - Development and Implementation of an Analytical Wind Ramp Prediction Tool for the CAISO
Amount: $398,662.00
Term: 24 months
Contact: Jamie Patterson
Committee Meeting: 7/20/2011

Funding

FY	Program	Area	Initiative	Budget	This Project	Remaining Balance	
09	Electric	ETSI	Transmission Research Program (TRP)	$1,000,000	$398,662	$0	0%

Recommendation

Approve this agreement with The Regents of the University of California on behalf of the Davis campus for $398,662.00. Match funding is being provided in the amount of $109,364.00. Staff recommends placing this item on the discussion agenda of the Commission Business Meeting scheduled on July 27, 2011.

Issue

The California Independent System Operator (CAISO) has a need for a wind forecast product that provides grid operators with advance warning of situations in which there is a high probability of a large change in wind power production over a relatively short time period. These types of events are commonly called "wind ramps". This type of information will be useful to the CAISO on multiple look-ahead time scales, but the greatest need currently appears to be for information on the time scale of zero to six hours ahead. The need for this type of information is anticipated to become more urgent within two to three years due to the anticipated large expansion of wind power production capacity in the Tehachapi Wind Resource Area over the next three to five years. Therefore, it is desirable to have a large ramp alert system that is fully operational and well tested in 2012.

Background

Presently, the CAISO and the Pacific Northwest National Laboratory (PPNL) are working on an effort titled Tools for Online Analysis and Visualization of Operational Impacts of Wind and Solar Generation funded by PIER (March 2009-October 2011). The objective of this effort is to develop a tool intended for use by the CAISO power grid operators to predict and display real-time (load following) capacity and ramping requirements affected by uncertainties in forecasts of loads and renewable generation. This project is looking at all available wind, solar, load and available generation forecast to produce a forecast of ramping capacity with a confidence level surrounding the capability forecast.

The tool developed under the CAISO/PPNL effort will use as input the most up-to-date load and wind forecasts, resources committed through the various market runs, generator forced outage information, and related uncertainties. However, it does not address the input data required to predict the ramps.

Proposed Work

This research will analyze historical wind ramp data and refine a prediction tool to provide a short-term probabalistic wind event forecast.

This effort proposes an approach to address the need of the CAISO by developing and implementing a wind ramp event prediction system that is optimized to predict wind ramps in the CAISO's control area. The region-specific weather regimes in the Tehachapi, San Gorgonio, Altamont, and Solano Wind Resource Areas will be the primary areas of focus. These areas, and other wind resource regions in California, are being studied due to the unique cause of wind ramps when compared to wind generation areas in other parts of North America.

The objectives of this agreement are to answer, among others, the following questions:

1. What defines a wind ramp event?
2. What atmospheric conditions will most likely cause a ramp event?
3. When are ramp events most likely to affect the grid?
4. What is the best way to measure ramp forecast accuracy?
5. What situational display tools are best to present upcoming ramp events?
6. How far in the future can a ramp event be predicted?

The answers to the above questions will then be used to develop a wind ramp event forecast tool for the renewable desk operators. This forecast will give the operators notice of a sudden change of power will occur with some level of confidence that the event will occur. For instance, the tool will indicate there is an 80 percent chance that a front with winds gusting to 50 mph will pass through the Solano Wind Resource Area within the next 45 minutes. This tool will enhance the operator's decision-making process for procurement of ancillary services, unit commitment and dispatch.

The overall project will require 18 months. During this period, the project will develop and search for a forecast service provider to conduct the weather research, design the proper ramp forecasting techniques (an iterative process) and develop a graphical display for the effort.

The project will enhance the grid operator's ability to make decisions on short-term dispatching of conventional generations by giving them a short-term forecast of deviations in the wind at individual sites. Optimizing the dispatch of traditional generation will help reduce the cost of thermal generation to the ratepayers of California.

There is interest by the private sector for this research and, for that reason, a competitive Request For Qquote is part of this effort.

Justification and Goals

This project "[has] the potential to enhance transmission and distribution capabilities" (Public Resources Code 25620.1.(c)(3)).

This project also addresses 25620.1(4) investments in...Advanced electricity technologies that reduce or eliminate consumption of water or other finite resources, increase use of renewable energy resources, or improve transmission or distribution of electricity generated from renewable energy resources.

This will be accomplished by:

- predicting short-term wind events and provide more accurate information to the grid operators regarding these events.